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मानक

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IS 3600-2 (1985): Method of Testing Fusion Welded Joints and Weld Metal in Steel, Part 2: Beam impact (charpy V-notch) test [MTD 11: Welding General]



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Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”



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Indian Standard



# METHOD OF TESTING FUSION WELDED JOINTS AND WELD METAL IN STEEL

## PART 2 BEAM IMPACT ( CHARPY V-NOTCH ) TEST

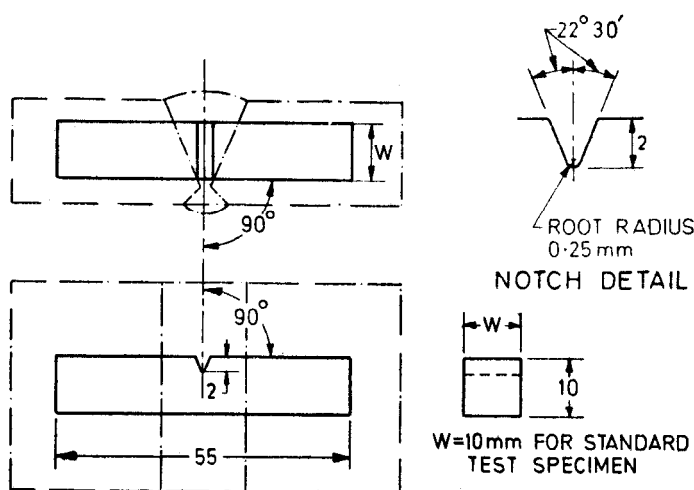
( Second Revision )

**1. Scope** — Prescribes the method of conducting the beam impact ( Charpy V-Notch ) test for welded material of thickness 6 mm and over in order to measure the fracture toughness in terms of beam impact V-notch energy when such energy is required to be evaluated at specified temperatures for weld metal, base metal and heat affected zone of welded joints.

**2. Definitions** — For the purpose of this standard, the definitions given in IS : 812-1957 'Glossary of terms relating to welding and cutting of metals' shall apply.

### 3. Preparation of Test Specimens

**3.1** The number, location and orientation of the specimens and notches shall be as specified in the application standard. The normal orientation of the notch is as shown in Fig. 1.



All dimensions in millimetres.

FIG. 1 CHARPY V-NOTCH IMPACT TEST SPECIMEN

**3.2** The shape and dimensions of the standard test specimens shall be in accordance with Fig. 1. The tolerances of the dimensions and the method of preparation shall be as given in IS : 1757-1973 'Method for beam impact ( V-Notch ) on steel ( first revision )'. The width  $W$  of the test piece with respect to weld and location of notch shall be as shown in Fig. 1.

**3.3** When the standard test piece cannot be obtained from the material, one of the subsidiary test pieces having width of 7.5 or 5 mm machined according to the dimensions and tolerances specified in IS : 1757-1973 may be used.

**4. Separation of Test Specimens** — The method employed for the separation of the test specimens shall be such as to cause minimum deformation and minimum heating. The best method is usually by machining. If thermal cutting or other methods which could effect the cut surfaces are used, the cuts shall be made at a distance from the test specimen greater or equal to 8 mm but in any case sufficient according to the process used, not to induce alterations which could alter the test results.

**5. Heat Treatment** — Test specimens shall be treated only if the welded part they represent is heat-treated, in which case they shall, where possible, be heat-treated together with the welded part before the test. Where this is not possible, the specimens shall be heat-treated separately, the treatment and the rate of cooling being similar to that given to the part.

**6. Testing** — The specimens shall be tested in accordance with IS : 1757-1973.

## **7. Reporting of Results**

**7.1** The following shall be reported for each specimen as results of the test:

- a) Dimension of test specimen,
- b) Location and orientation of the notch.
- c) Testing temperature (°C),
- d) The energy absorbed ( joules ) in accordance with IS : 1757-1973.
- e) Description of the appearance of the fracture surfaces and the type and location of any weld defect present.

**7.2** Because of the likely scatter of results, at least three specimens are normally used to assess the joint represented.

## **EXPLANATORY NOTE**

The standard was first published in 1966 and subsequently revised in 1973 covering various tests on fusion welded joints and weld metal in steel. In view of the experience gained and in order to bring the test and test requirements in line with other international standards published so far, it has been decided to revise the standard in the following parts:

- Part 1 Cruciform fillet weld tensile test
- Part 2 Beam impact ( Charpy V-notch ) test
- Part 3 Transverse tensile test on butt welds
- Part 4 Longitudinal tensile test on cylindrical weld metal test pieces on butt welds
- Part 5 Transverse root and face bend test on butt welds ( corresponding to ISO 5173-1981 )
- Part 6 Transverse side bend test on butt welds ( corresponding to ISO 5177-1981 )
- Part 7 Longitudinal root and face bend test on butt welds
- Part 8 Nick break test and fillet weld fracture test
- Part 9 Macro and micro examination.

In this revision free-bend test has been deleted as the ductility of the weld zone is being assessed more and more by other bend tests. Special tests such as tests for the susceptibility to lamellar tearing, reheat cracking, brittle fracture and creep fatigue will be covered in separate standards.

The main purpose of this standard is to recommend test procedures and test specimens that should be quoted or incorporated in engineering application standards that deal with welded constructions primarily for the qualification of welding procedures and operators. Where differences still exist between application standards, the methods of test given in this standard should be preferred.

A general indication is given of the purpose served by the tests specified in this standard, but this standard does not indicate the choice of test method nor a particular application nor the number of specimens to be tested or the repeat tests to be allowed in event of failure. Such requirements are matters to be dealt with in the particular application standards where they exist or to be agreed between the manufacturer and the purchaser.

It should be realized that variations in welding procedure and the preparation of test specimens can give rise to variations in the test results.

In preparing this part of the standard assistance has been derived from, BS : 709-1983 'Destructive testing fusion welded joints and weld metal in steel, issued by British Standards Institution.

In reporting the result of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS : 2-1960 'Rules for rounding off numerical values ( revised )'.